Measurement of Alpha Contamination on Surfaces using an Electret Ion Chamber (EIC)

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PI: Florida International University

Collaborator: S.K. Dua, Ph.D.

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Florida International University

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Technical Overview

- **Electret Ion Chamber Technology**
  - Electret Ion Chamber (EIC)
    - Electret - a charged Teflon disk
    - Ionization chamber
  - Electret
    - Collects ions produced by alpha radiation.
    - Surface charge is reduced through collection of ions.
    - Rate of reduction of the surface charge gives a measure of alpha radiation.
    - 3 thicknesses (0.013, 0.16, 4.76 mm) commercially available.

Technical Overview

Electret, Chamber and Charge Reader

Field Deployment Scenario

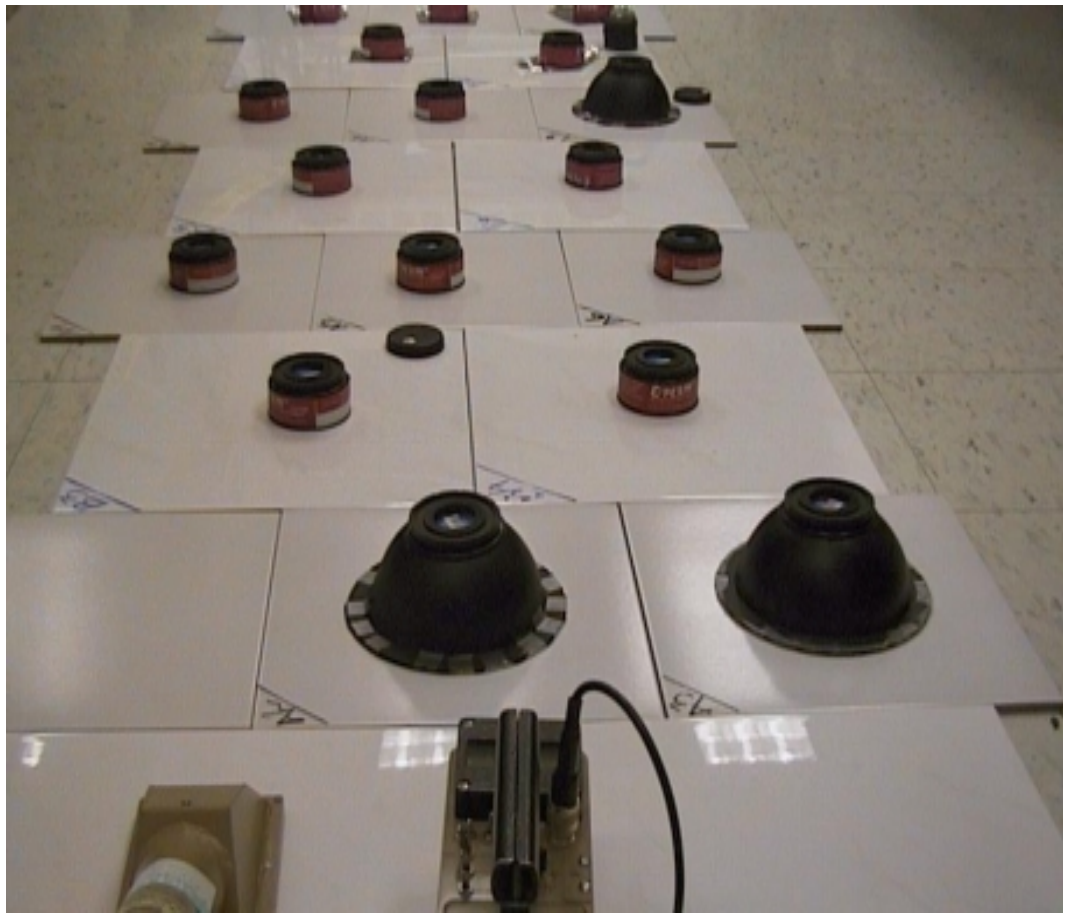
Comparison with Baseline Technology

- **Baseline Technology**
  Alpha Probe and Scaler
  - Hand-held alpha monitors: gas flow/filled proportional counters, scintillation counters
  - Floor monitors- low sensitivity Alpha particles small range (~0.004 cm in tissue/paper) detector window- thin, placed close contact with floor
  - Wipe test - removable contamination, generates waste

- **Electret Ion Chamber**
  EIC and Reader
  - Passive charge integrating device; for measurement EIC is placed on surface (floor, walls, etc.) and picked up after known exposure time
  - Reusable chamber; chamber rim can be decontaminated
  - Not affected by puncturing/ damage of thin Mylar window
  - Total alpha contamination

- **Cost savings analysis to be performed in SRS LSDDP**

FIU-HCET ceramic tile test-bed



Test Bed Results - Comparison EIC vs. Alpha Probe

Description of Tiles	Alpha contamination (dpm/ 100cm^2) EIC	Alpha Probe
White 13" X 13" Décor Vitro Tiles	122.43 ± 13.80	126.27 ± 2.04
Beige Marble 16" X 16” (Prima) Stylnu Tiles	65.88 ± 12.06	59.01 ± 2.05
12" X 12” White Tiles	33.22 ± 7.56	36.98 ± 3.20

Conclusions

Comparative study with a baseline technology shows

- EIC more rugged- Mylar window damage, no effect on performance.
- Lowers personnel exposures- 27 hours for 200 measurements.
- Less expensive- saving of $ 150 M for measurement on concrete surfaces alone.
- Technology is mature for demonstrations (LSDDP- SRS) and deployment (OR).
- Data from LSDDP- SRS in support of DDFA will be used for ITSR.
- Inexpensive large area ceramic tiles test-beds are useful for comparative assessment of alpha measuring techniques and instrument calibration.